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Lecture -61
Water Pricing Models

Welcome back friends, so last class we discussed about the water pricing what is the concept of water pricing and why it is important? Now this particular class we are going to talk about water pricing models.

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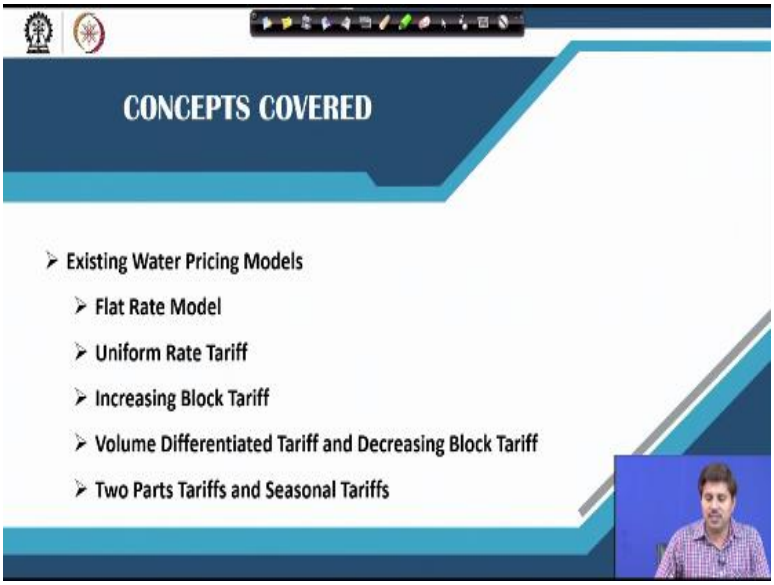

We will discuss what are the various existing water pricing models particularly like; Flat rate model, Uniform rate tariff, Increasing block tariff, Volumetric differentiated tariffs and Decreasing block tariffs and we will also talk about two parts Tariffs and Seasonal tariffs.

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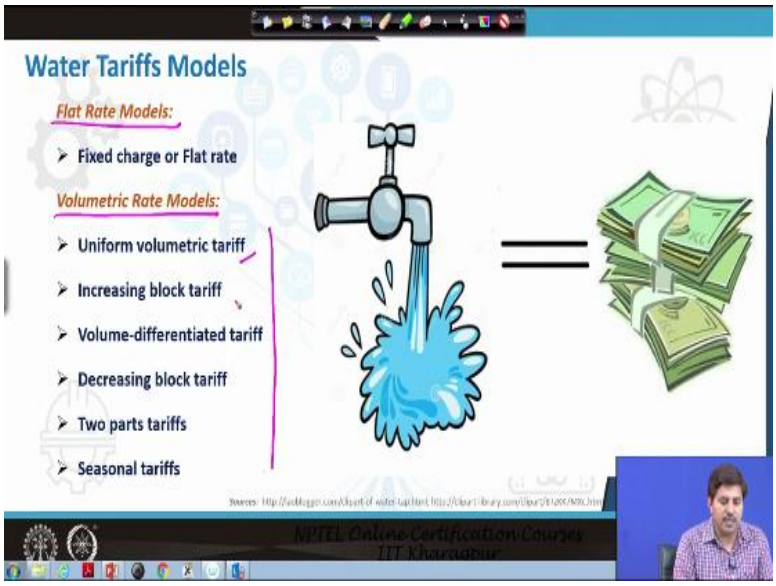

So these are the various water tariff models there are you can categorize them into two broad ways: the flat rate models and volumetric rate models. The flat rate models are basically fixed charge or flat rate, so it does not depend on the volume of water used and whereas that is why it is known as non-volumetric model as well whereas the volumetric rate model relies upon the volume that is being consumed.

And there are several like such pricing schemes available like uniform tariffs, then increasing block tariff, volume differentiated tariffs, decreasing block tariff, two part tariff, seasonal tariffs, there are several such schemes are available.

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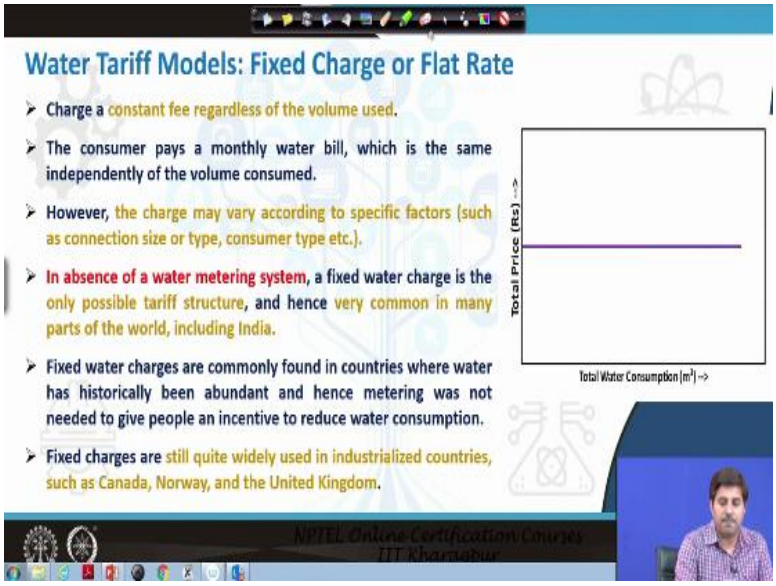

Now the fixed charge or the flat rate model is basically a charge, a constant fee regardless of the volume used. So practically it does not measure the volume, so consumer pay a monthly water bill which is same independent of the volume consumed. If somebody is using, say more water somebody is using less water both will end up paying the same amount. So like in case when you do not record in absence of water metering system you have only this option left.

Where basically you can put a pause like fixed charge and this is very common in many parts of the world including India. There are fixed charges are commonly found in countries where, there are historically water has been abundant and metering has not been put in place. So in other countries like various industrialized countries, such as Canada, Norway, UK also these kind of models are very popular.

So there is no meter install in the house, if you are say using ten kilo liters a month, 20 kilo liters a month, 30 kilo liters a month. Eventually everybody is going to pay same because there is no recording itself. There may be different charges that relies on the specific factors such as the connection size or type or the consumer type.

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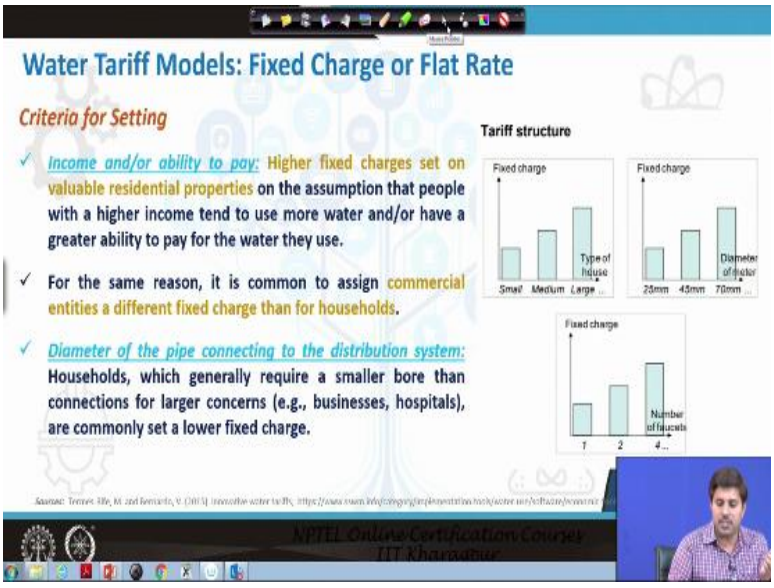

So that is again within a consumer class it is still going to remain the same. So how do we set we may set it based on the income and ability to pay, so we may set higher fixed charges set on the valuable residential property. So we say like what is the area in which houses and based on the

area we can set up a fixed charge. So let us say we make, with area less than 200 meter square houses.

They will pay some x1 amount of price with a 200 to 300 meter square area they will pay some say x2 amount of price. So this price may vary based on the area based on the residential properties it may vary based on the pipe connecting the distribution system. So many utilities like, offer that you may go for say, 20 mm pipe, 15 mm pipe, so depending on the pipe size that the connection pipe size you will be charged a fixed rate.

So if you are going for a higher dia pipe, if you are going say 25 mm pipe will be charged something, if you are going for a 70 mm pipe you will be charged higher. It is still going to be the fixed rate but it will be charging at a higher rate. So similarly for a small houses lesser price; for large houses higher price, medium houses medium price. The number of faucets in household can be another criteria.

If you have say 4 or higher number of faucets you will be paying this much price, for a lesser number of faucets you will be paying this much price. So like we may see that different price structures across different, like for different type of consumers but within a consumer section the price remains same irrespective of the amount of water consumed. So, because it can varies depending on the connection type. So, commercial entities are typically charged at a different rate than that of the household entities.

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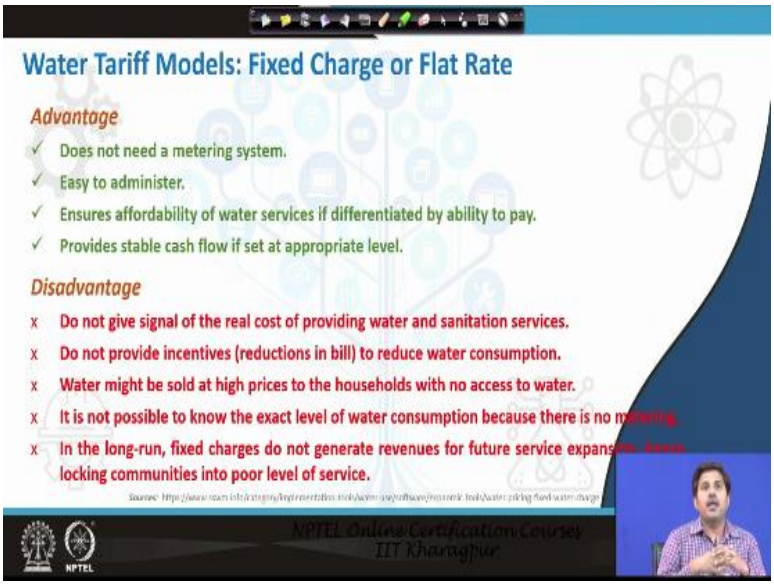

So that is the, like criteria for fixed charge, fixed price model. The advantage is that, it does not require a metering system. It is easier to administer because you have going to charge same from everyone within a consumer class. Then it ensures affordability of water services, if kind of provided that which charges are kept that way and it provides a stable cash flow if set at appropriate level.

So if you are sitting a, say monthly tariff and everybody is paying that you are getting that much amount of water fixed amount in a month irrespective of how much water is being pumped or how much investment are being made? But a stable cash flow is ensured for the utility. On the disadvantage front it does not give any signal to the real cost of providing water and sanitation services if you are just like providing water at a fixed price.

People will not know whether the cost of services are more than that or less than that, no information is there, no signal is there, it do not provide any incentive for like reducing water consumption because there is no reduction in the bill you use less water then also will be paying the same amount. Water might be sold at high prices to the household with no access to water. So somebody might let us say, fill that water and sell to the other houses.

Where there is no water at a higher prices because he is getting for free, he is not paying for that water and it is not possible to kind of see exact level of consumption because there is no

metering in a long run. Fixed charges do not generate revenues for future expansion, so these are some of the disadvantages.

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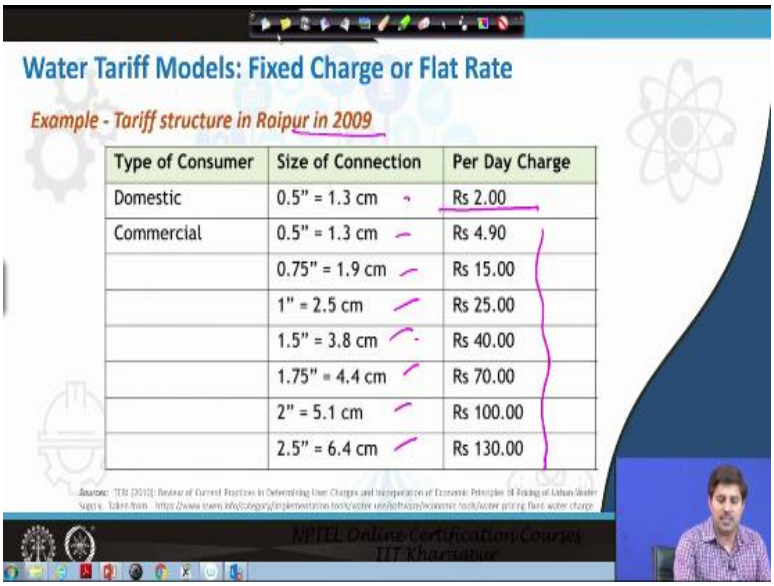

This is an example like in the Raipur in 2009. So depending on the different connection sizes 0.5 inch connection for domestic per day charge was rupees 2.00 that means 60 rupees a month. For commercial connections again depending on the pipe sizes there are variable connection ranges.

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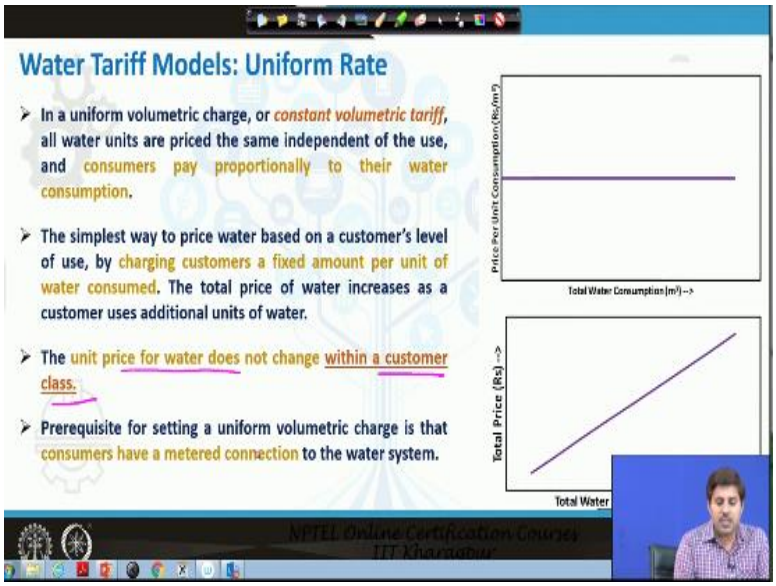

Then in the volumetric tariff the first type of model or the very basic type of model is the uniform rate, this uniform volumetric rate is basically a constant volumetric tariff. So here the water rates that means price per unit of water remains same independent of the uses, so consumer

pay proportionality to their water consumption. So, it is simplest way to price water because you are putting a price to the water.

So you are saying that price to water, say for my water, if I set up price here. So if consumer is using this much, he will be basically paying this much price, if he is using this much he will be paying this price. So your price is directly based on the consumption, so if you have say X rupees per kilo liter and somebody is consuming V volume, so you multiply V into X and you get their monthly water bill.

If he is consuming V kilo liters and your rate is X rupees per kilo liter, you multiply that you get the straightaway the monthly water bill. So your monthly water bill is V into X. This that is why, it is a simplest way, Consumers are charged fixed amount per unit water consume and the total price will increase based on the increase in the consumption. So the one who is using more water will be basically paying more but unit price of water does not change within a consumer class.

Again here also depending on change of the consumer class we can set up different tariffs. So for industrial we say, let us say 2 rupees per kilo liter for industries we may set 4 rupees per kilo liter. So for a different type of consumer class we may have different rate but within a consumer class the prices are same. So prerequisite for setting up a uniform volumetric charge or any volumetric model is basically consumers have to have a metered connection because then only we will be able to monitor.

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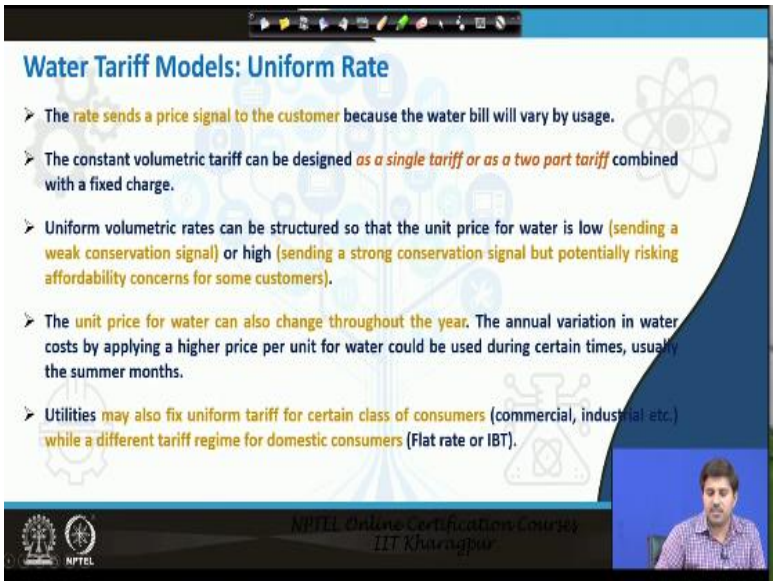

The how much volume is consumed? How much water is consumed? So we have, to have a metering system in place. In the uniform rate, the rate sensor price signal to the consumer because if they are using more water they will be basically paying higher price. This can be designed as a single tariff for as a two part tariff. So in a two part tariff, practically there will be fixed charge which is say for administrative charges or for other kind of fee.

So you will be, say having a X0 or say as a free or say P0 as a free price, fixed charge and then the rest will be depending on the volume and the rate. So that becomes your overall total water bill. So if it is a two-part tariff or if it is a single part tariff, then total bill is just volume consumed into the tariff whatever is there.

Now uniform volumetric rate structures are, so that the unit price of water is low. If unit price of water is low then it sends a weak conservation signal or if it is high then it sends a strong conservation signal but then for high tariffs there is a risk of compromising the affordability concerns for the consumers because if price is very high per unit water so then it may not be affordable for certain set of consumers.

The unit price for water can also change throughout the year, so there might be like seasonal variation can also come in here. So usually in summer month you can see that the tariff rates are increased while in winter months tariff rates are decreased. Utility may also fix a uniform tariff

for certain class of consumers and opt for a different tariff regime for a different class of consumers. So, like it can fix a uniform tariff, for say, commercial or industrial connections and for domestic connections. It can go for a tariff model like flat rate or increasing block or that kind of tariff rates.

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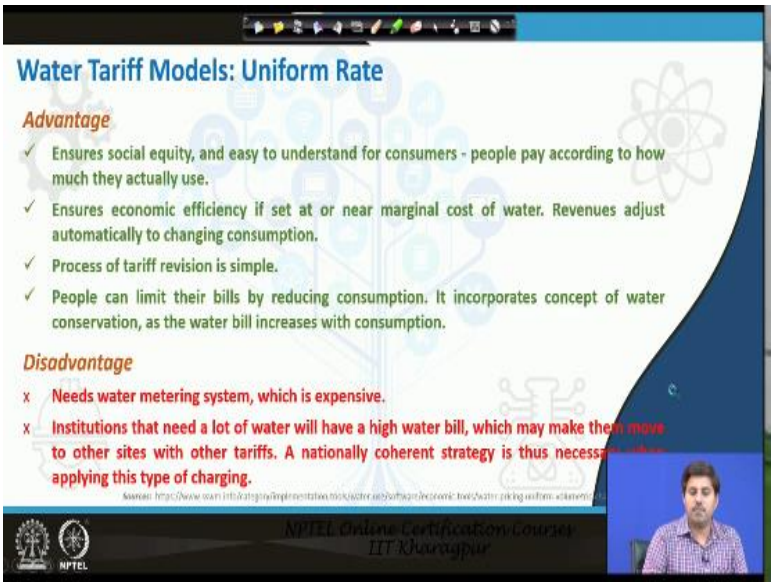

The advantage is that, it ensure social equity because everyone is paying at the same rate, it ensures economic efficiency. So whatever water is consumed; that revenues are collected according to the consumption. The tariff revision is simple we just need to change the rate and people can limit their bill by reduced consumption. So that way concept of water conservation is also supported with this kind of tariff.

On the disadvantaged front it needs water metering which is expensive and institution needs a lot of water which have high water bills and that may make them look for the alternate sites or other tariffs. So it has to be seen that the prices are proportionate throughout the other places as well.

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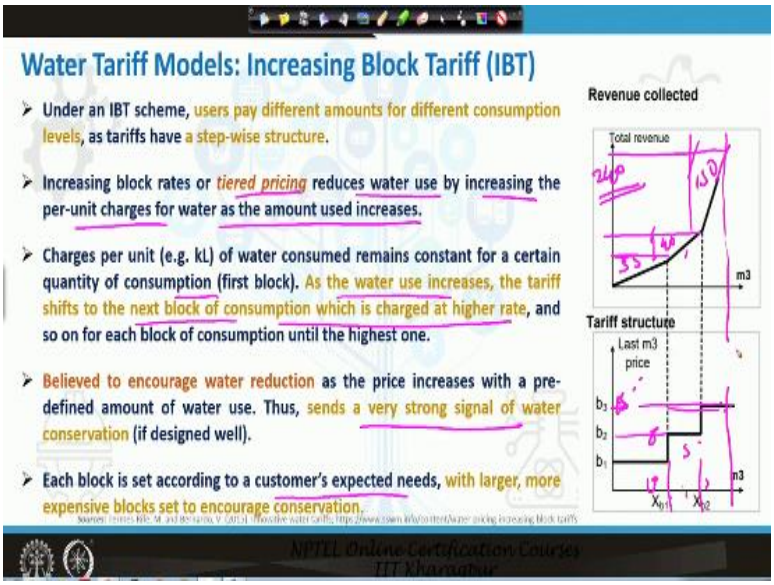

The next type of model is the increasing block tariff, which is IBT. So IBT is one of the most popular metering regime most popular pricing methods these days. Users pay different amounts for different consumption levels and these structures are generally stepwise structures. So you can see like we will have up to certain levels of consumption charges are this. Then for higher level of consumptions charges would be this, for further higher levels of consumption charges would be this.

So if somebody is consuming this much of water their bill is going to remain this much but from this point forward, so let us say if this is 10 kilo liter. So up to 10 kilo liter your charges are say 5 rupees per kilo liter. So you will be paying 50 rupees for the first 10 kilo liters and then if you are using another, say 4 kilo liter and you are actually paying 8 rupees, this is say 8 rupees per kilo liter. So if you are using another 4, so for remaining 4 you will be paying at the rate of 8.

So the difference here would be based on the amount that you are, basically 8 into 4 because they have consumed 4 kilo liter at the rate of 8. So that will be paying 32 rupees here, so total you will be paying that way 50 + 32 means 82 rupees. If you are using say 25 kilo liter and the prices here is, say 15, so that means up to 10 kilo liter, you will be paying 50 for remaining 5 you will be paying 40 again.

So say here, up till here you paid 50, up till here you paid 40 more, because this is, say 8 and this is, say 5, so this will be 40 and if this is, say 15 the third block is at 15 and you have consumed 25. So that means 10 and 5, 15, so remaining 10 you will be paying at a rate of 15. So you will be paying basically 150 rupees more for the enhanced consumption. So the total water bill is going to be 50 + 40, 90 + 150 that is 240.

So it is charged that way, increasing block tariffs are tired prices that way and which kind of reduce water use by increasing the per unit charge for water. So this sends a very strong signal for water reduction it is a very strong signal because if somebody is consuming higher water, so he will have to pay at a higher rate also. So, if design well that way it can be helpful, at the first block the rates are low and then as the water use increases the tariff shifts to the next blocks which is charged at a higher rate.

Each block is set according to the customers expected need with larger more expensive blocks are targeted to set the conservation, go further lesser water consumption.

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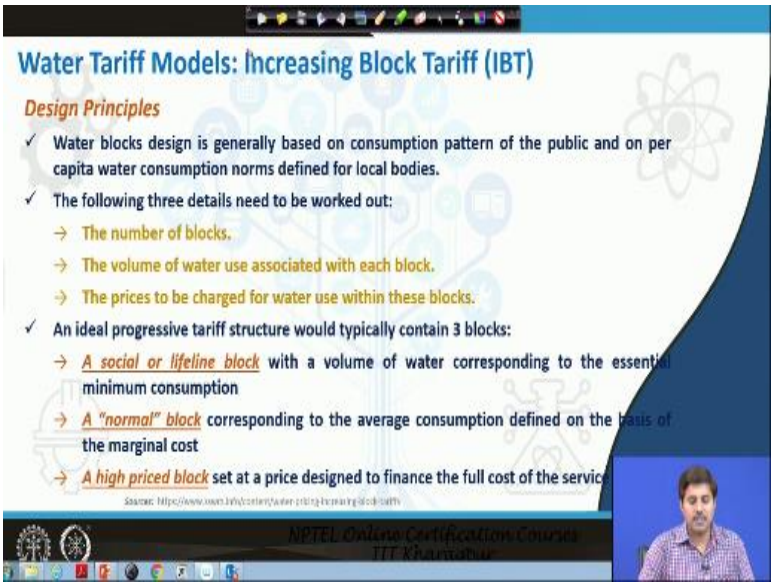

So the design principle here is that we see like, the what we need to basically follow three details; the number of blocks, how many number of blocks we are going to provide? Volume of water associated with each block and the price to be charged for each block? So we are going to

have say, a 3 block system or a 4 block system and what is going to be the charge for each of the blocks? An ideal progressive tariff structure typically contains minimum 3 blocks.

The first block is called a social or lifeline block where the volume of water corresponds to the essential minimum consumption and this is charged at a very low rate in order to make it affordable. So let us say, consider that ten kilo liter per month is bare minimum which people would be using and that much water they should get at a subsidized rate or lower price. So you can keep say 5 rupees for first 10 or then there is a normal block which corresponds to the average consumption defined on the basis of the marginal cost.

So on the basis of marginal cost you can basically put say price here, say 10 rupees for the next 10 kilo liters and if somebody is using beyond that so there is a high-priced block which said to price designed to finance the full cost of the services. So if somebody is using beyond this, like this you say, that bare minimum. So you should be able to consider that, this has to be affordable.

So even people with low-income group should use water within this range and should basically be charged at a very low price whereas those who are using higher rates they will be basically charging at a like those who are using more volume will be charged. The extra volume will be charged at a higher rate which is a middle range and generally on the marginal cost basis and the one who is actually using even higher. There should be even penalized for this one maybe and should be charged further higher.

So that people are discouraged to go into the third range and helping the water conservation objectives. So these are the kind of 3 basic blocks, that must be there.

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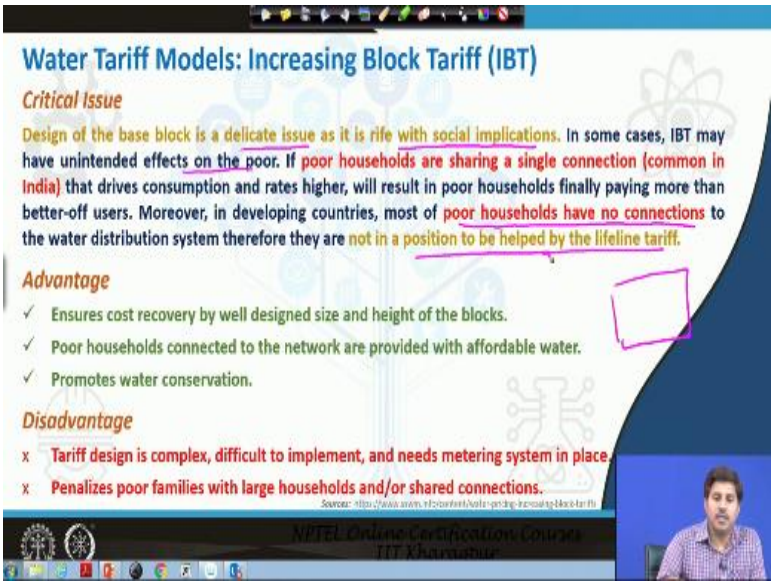

In IBT the critical issues are there, that the design of the base block is a very delicate issue and may have social implications. In some cases it has unintended effect on the poor because if poor households are sharing a single connection. So mean let us say many households are sharing a single connection or family is very large, so it does not consider size of family. In a well-to-do family if there are two people they are consuming ten liter water paying at the same price.

If say family of 15 people they will obviously consume at a more water more than say 10 or more than 20 and then they will have to pay at a higher price. So like very well-to-do family might end up paying at a very base level because number of people are less in the household, whereas a poor family because of more number of people in the households may end up paying very high tariffs.

Also in India like, many other developed countries poor households have no connection to the utility and then water distribution system like, if whatever we are putting the lifeline tariff. They are not getting help with that because it is not reaching them. So these are some of the critical issues in setting up in IBT. The advantages are that it ensures the cost recovery with a well-designed size and height of the block.

The poor household connected to the network are provided the affordable water in a base block and it promotes water conservation because it gives a strong signal to cut down the water

consumption at the higher consumption are charged at a higher rates. The disadvantages is that the tariff design is relatively complex we have to have several blocks. It is difficult to implement and need metering system in place and it penalized poor families with large households or shared connections.

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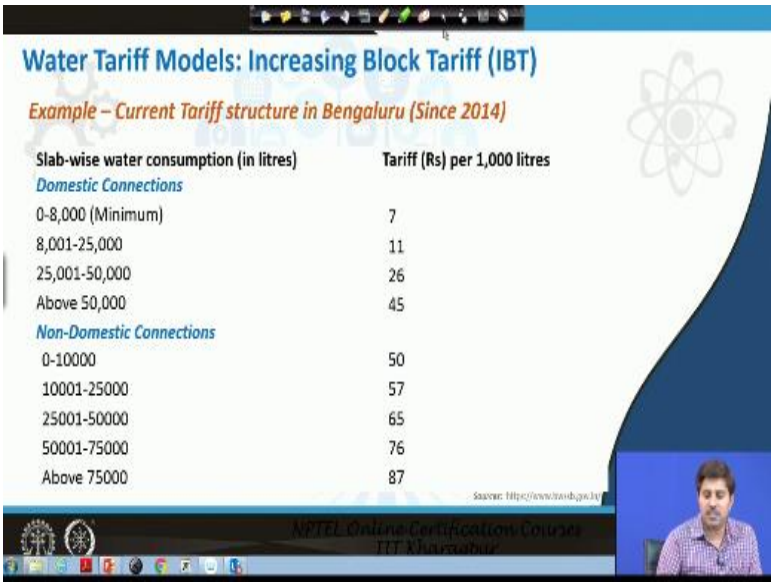

This is an example for Bangalore, so since in 2014 Bangalore revised their rate and since then they are actually offering this rate. So for domestic connections from 0 to 800 liters means 8 kilo liters the charges is 7 rupees per thousand liters or per kilo liter. 8 to 25 the charges are 11. 25 to 50 charges are 26 and above 50 it is 45 and for non-domestic connections or commercial connections it is for first 10 kilo liters the charges are 50. 10 to 25; 57. 25 to 50; 65 and then up to 75 it is 76 and above 75 it is 87. So these are the different tariff structures.

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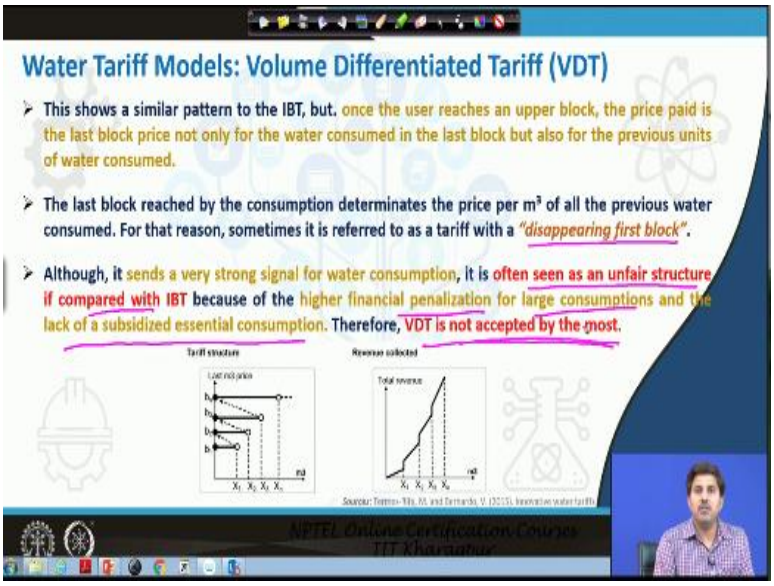

Which are followed for commercial and non-commercial, domestic and non-domestic connections in the Bangalore? There are few other water tariff models like the volumetric differentiated tariffs. Now this volumetric differentiated tariff is similar to IBT but, it like in IBT, also here also we have a different block of tariffs. So we have consumption, for consumption up to, say this amount the rates are this.

For consumption up to this amount the rates are higher but the problem here is, unlike IBT where the first set of, let say in an IBT model for first block consumption say, that 10 liter is 10 kilo liter is first block. So for this 10 kilo liter consumption you will be paying at this rate, for next consumption you will be paying at, whatever is the block rate, for further higher consumption, you will be paying at this rate.

But in volumetric differentiated tariff, once user crosses this block, so if say somebody has consumed 11 kilo later, it has reached in this block. So it will not be paying for the 10 kilo liter at base price and then one kilo liter at extra price but it will be paying for all 11 kilo liter at the price here. So if your consumption is in this range for entire water your tariff will be this. If your consumption is here.

So for entire consumption your tariff is going to be this and it is not that for first X1 liter you will be paying B1 and X2 liter, you will be like X1 - X2 liter, you will be paying at the rate of B2 it

does not work that way. So basically the consumer pays at a rate in the last block in which he is there and for the previous unit of water consumed also he pays at that rate. So the last block that is reached by the consumption determines the price per meter cube of the all water consume and for that reason sometimes this is referred as a tariff with disappearing first block.

Because if you have reached in a next block the first block has gone, for you will be paying for entire water at that particular rate. Now although this sense of very strong signal because in IBT also the signal is strong but it discouraged to go upper but still you pay lower prices for the base and therefore the medium range and only the prices are very high for a higher range. Here if you have moved to the higher range you might be like paying for entire water at that particular rate itself.

So that is the problem and that is why, it is says as disappearing first block because your earlier block has disappeared they are not your entire consumption has to be now paid based on that and that is why he like often it is seen as an unfair structure in compared with the IBT because higher financial penalty is there for large consumption and there is lack of any subsidy for essential consumption. So that is why this model is not accepted by the most.

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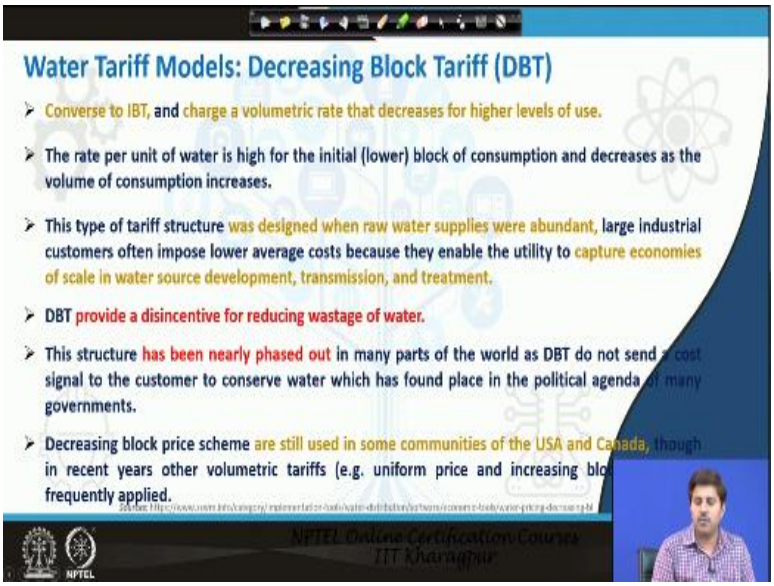

Then there are a couple of other models like there is decreasing block tariff which is again a more or less obsolete model. It has been nearly phased out it is basically a opposite to the IBT. In

IBT we have the rate keeps on increasing block wise, whereas in DBT or decreasing block tariffs the first block is charged at a higher rate and then rates keep on decreasing as the consumption increases.

Now the rate per unit water is high in the initial or lower block of consumption and decreases as the volume of consumption increases. So this type of tariff was designed when basically raw water supplies were abundant and then large industrial consumers were often imposed lower average cost because they enable the utility to capture the economy in this scale. It is like decreasing block tariff, are popular in various other regimes tape.

But it has been almost phased out from water, so you are buying something if you buy 1kg you pay certain price, if you buy 10kg you pay lesser price, for that. So that is kind of decreasing block because when your consumption is higher you end to pay lesser. In Indian railway if you see, if you travel a 100 kilometer you pay certain fare, if you travel a thousand kilometer, fare is not 10 times here, fare is maybe just 3/4 times of the these things.

So although you are travelling lesser distance, so but extra distance is charged at a lower prices. So similarly like here also, water also this concept was existed earlier but now because if this model provides a disincentive for reducing wastage of water. People using higher water will be paying very less for that additional price. So they are not considered, so that is why it has been nearly phased out, this is a strongly discouraged model everywhere.

Now still are used in some communities but people are more sitting now towards the uniform or increasing block tariffs rather than going for this.

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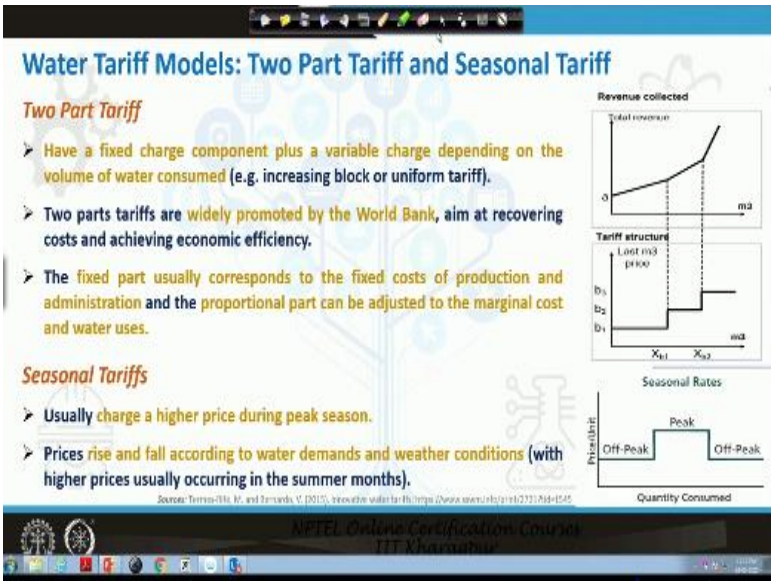

There are two part tariff and seasonal tariff models. So these two part tariff models have a fixed charge component plus a variable charge component, on the volume of the water consumed. This would be like increasing block or uniform tariffs, so let us say if you are having increasing block tariffs, so you do not start with a 0 for consumption you rather starts with a fixed charge. So this is your fixed charge which will be there and for remaining consumption you will be charged at certain levels.

Or if it is a uniform model, so instead of starting from here, it will start from here because you would be paying certain fixed charge which is irrespective of the consumption and then for the remaining part based on the consumed volume whatever tariff model is used is will be utilized. The World Bank is widely promoting this model aiming to recover the cost and achieving the economy efficiency of the services.

The fixed part usually corresponds to the fixed cost of production and administration and the proportional part can be adjusted to the marginal cost and the water uses. Then there are seasonal tariffs which charge higher water prices during peak season. When the season is peak the per unit water price is higher and when season is in the off peak, the per unit water prices are lower. So prices rise and fall according to the water demand and weather conditions.

So in summer months the prices will be higher and in the off peak season or when there is no water shortage the prices per unit water could be lower. So this also is for discouraging the water consumption during the peak period. So that the water conservation can be achieved when there is a crisis.

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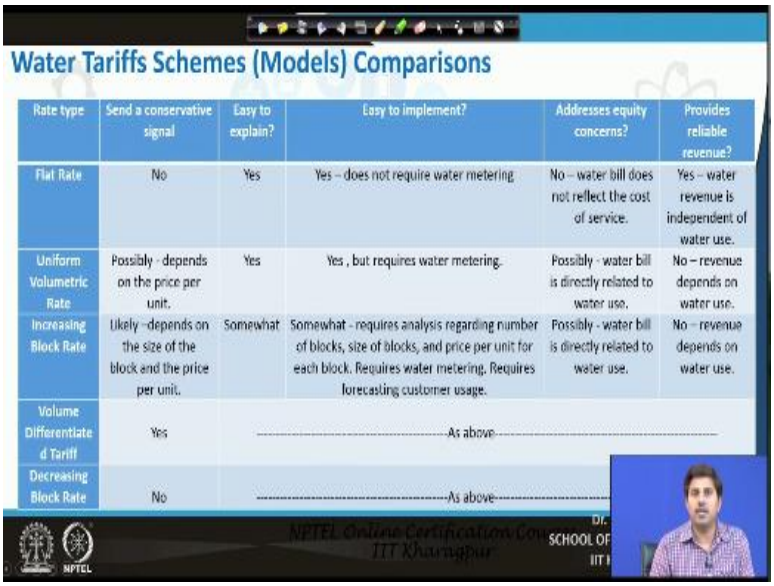

Now this is the water tariff schemes comparison. What we have discussed so far, so flat rate it does, it send a conservation signal, no it is easy to explain, yes very easy to implement. Yes it does not require metering, it addresses the equality concerns, no water bill does not reflect the cost of the services, it provides reliable revenue, yes a fixed revenue is provided but that is independent of water use.

The uniform volumetric rate it sends a conservative signals yes depending on the what is the price. It is easy to explain, yes, easy to implement, yes there is fixed price but it does require metering and it addresses the quality concerns possibly yes because water bill is directly proportional to the water use and it provides reliable revenue. Revenue new again depends on the water use. So if people are not using water not much consumption is there you would not get revenue unlike in the flat model.

Increasing block rate sends a conservation signal, yes if, the blocks are made that way so it will send a conservation signal, easy to explain, yes it is somewhat easy to explain but still like more

complicated than the other too, easy to implement, it requires basically the setting up number of block, size of block per unit block rate, requires metering, requires forecasting customer uses in order to setting up the block. So those are the things there but then it can be implemented.

It addresses equality concerns and it also does not provide a reliable source of revenue because revenue again depends on the consumption. The volumetric differentiated tariffs and decreasing block tariffs, so if you say the volumetric differentiated tariffs it sends a conservative signal absolutely yes because it is charge the higher consumption at high rates. Decreasing block tariffs no it does not send and it is less thing more or less remains like IBT structures only they are also different tariff rates model so somewhat similar to that.

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So with this we conclude the discussions here, we have talked about the pricing strategies in the previous class and then we discussed about the various water pricing models here, will take up possibly some examples and worked examples in the next class. Thank you.